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EMPIRICAL STUDY OF THE CHARACTERISTICS OF CURRENT-STATE ORGANIC BULK HETEROJUNCTION SOLAR CELLS , Ben Minnaert and Marc Burgelman, University of Gent, Dept. ELIS, Pietersnieuwstraat 41, B-9000 Gent, Belgium.

We studied and compared the reported characteristics of 22 different bulk heterojunction organic solar cells fabricated and characterized by different research institutes. We only considered bulk heterojunction solar cells where both the acceptor (the *n*-type) and the donor (the *p*-type) are organic. All cells were characterized under illumination with the standard A.M. 1.5 spectrum and an intensity of 100 mW/cm².

Both the material properties (the highest occupied (HOMO) and lowest unoccupied molecular orbital (LUMO) of donor and acceptor and the absorption window) and the device characteristics (the open circuit voltage V_{oc}, the short-circuit voltage J_{sc}, the fill factor *FF* and the efficiency) are compared and related to each other. One finding is that not the V_{oc} , but the J_{sc} is the limiting factor for obtaining a high efficiency with the current state of technology. Also an empirical threshold of 0.2 eV is found between the LUMO's of the donor and acceptor, necessary for exciton dissociation. There has long been a debate about the origin of the V_{oc}. In recent literature, it is proposed that the V_{oc} is not related with the work function difference of the contacts, but with the energy difference between the LUMO of the acceptor, and the HOMO of the donor (called 'the interface bandgap'). A relation between the V_{oc} and the energy levels of donor and acceptor is derived from our empirical study, confirming – to some extent – the dependence of the V_{oc} on the interface bandgap.